

### Releasing Augmentation Sets When No Longer Needed

There are a number of circumstances when an augmentation set 150 should be removed from the map of a thrashed set ("unmapped"), when appropriate. A first circumstance occurs when the augmentation set becomes a thrashed set while it supports a thrashed set.

- 5 Unless a symmetric static-pairs augmentation set assignment approach is used, the augmentation set should be unmapped. Thrashing of the augmentation set is detected in the same way that the thrashed set was detected.

A second circumstance occurs when the augmentation set is no longer needed, i.e., the thrashed set is no longer being thrashed. The determination that an augmentation set is  
 10 no longer necessary is difficult. It may be desirable to differentiate between two situations: 1) thrashing has been decreased or eliminated, but the augmentation set is still necessary, and, 2) thrashing is not likely to occur if the augmentation set is unmapped. One approach is to establish a minimum number of cache accesses (access period) for which a set is augmented. If the set is no longer thrashing at the end of the access period, the augmentation set is unmapped. If the  
 15 second detection approach is used, for example, when a set is augmented, its entry in the SMT 300 may be invalidated. If the set continues to experience thrashing, the thrashed set will again be augmented during the following period, if not, its augmentation is discontinued.

A third possible circumstance for unmapping the augmentation set is when the augmentation set is ineffective in decreasing thrashing in the thrashed set. One approach is to  
 20 unmap the augmentation set if a thrashed set continues to thrash after it is augmented. This is the simplest approach but it may not be desirable if thrashing decreases after a thrashed set is augmented but still occurs at some level. The degree to which thrashing is decreased may be determined with appropriate logic if desired.

It is to be understood that the embodiments and variations shown and described  
 25 herein are merely illustrative of the principles of this invention and that various modifications may be implemented by those skilled in the art without departing from the scope and spirit of the invention.